

In re: Maeda, et al.
Appl. No. 09/631,491
Filed: August 3, 2000
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REMARKS

This is in response to the Final Office Action mailed April 1, 2002, in the above-referenced application. The rejections of record are addressed below in the order presented in the Office Action.

Claims 1, 6, and 16 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite. Claims 1, 6, and 16 have been amended by removing the word "type" from the claims. Applicants submit that the amendment renders the claims definite and accordingly request withdrawal of the rejection.

Claims 1, 16 and 17 have been amended by reciting that the Co content of the claimed alloy is greater than zero and less than or equal to 6%. Basis for the amendment is found throughout the application, such as page 2, line 11 and line 20, which state that the compound contains Co, and such as page 6, line 13, which states that a preferable upper limit for Co is 6%.

Rejection under 35 U.S.C. 103(a) in view of Yanagihara

Claims 1, 5-7, 16, and 17 stand rejected under 35 U.S.C. 103(a) in view of Yanagihara et al. (JP60-250557). Yanagihara teaches $\text{LaNi}_x\text{Co}_y\text{M}_z$, from which a composition can be selected such that the alloy contains 1.0wt% Mg, 6.0wt% Co and 34.57wt% La with the balance Ni. Although the ranges of Yanagihara fail to disclose those ranges claimed in the application, the claimed alloys have been rejected as obvious in view of the reference.

Heretofore, all rejections in view of the Yanagihara reference have been based upon the English abstract of the reference. To aid in better understanding the Yanagihara reference, a full English translation of the reference is enclosed along with form PTO-1449. As shown below, Yanagihara does not teach the alloys of the claimed invention. As further shown below, Yanagihara does not motivate one of skill in the art to expand beyond the teachings of Yanagihara to accomplish the achievements of the instant application.

First, the reference does not teach the claimed alloys. Yanagihara lists fourteen alloy compositions. The La, Mg, and Co contents have been calculated for each composition as shown in Table 1.

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Table 1. Alloy of Yanagihara et al.

No.	Alloy	Content (wt%)		
		La	Mg	Co
1	LaNi ₅	32.1	0.0	0.0
2	La _{0.9} Ca _{0.1} Ni _{4.5} Co _{0.5}	29.6	0.0	7.0
3	LaNi _{2.7} Co ₂ Al _{0.3}	32.8	0.0	27.8
4	LaNi ₃ Co _{1.7} Al _{0.3}	32.8	0.0	23.7
5	LaNi _{3.5} CoAl _{0.5}	33.3	0.0	14.1
6	LaNi ₃ Co ₂	32.1	0.0	27.2
7	LaNi ₃ Co _{1.7} Sn _{0.3}	30.8	0.0	22.2
8	LaNi ₃ Co _{1.7} Mg _{0.3}	32.9	1.7	23.7
9	LaNi ₃ Co _{1.7} Fe _{0.3}	32.2	0.0	23.2
10	LaNi ₃ Co _{1.7} Fe _{0.3} Mo _{0.1}	31.5	0.0	22.7
11	LaNi ₃ Co _{1.7} Ta _{0.3} V _{0.1}	29.3	0.0	21.1
12	LaNi ₃ Co ₂ Cr _{0.3}	31.0	0.0	26.3
13	LaNi ₃ Co ₂ Mn _{0.1}	31.7	0.0	26.9
14	LaNi ₃ Co ₂ Al _{1.2}	34.2	0.0	29.0

* Atomic weight for each element is as follows:
 La: 138.9, Ca: 40.1, Mg: 24.3, Ta: 180.9, Mn: 54.9
 Ni: 58.7, Al: 27.0, Fe: 55.8, V: 50.9,
 Co: 58.9, Sn: 118.7, Mo: 95.9, Cr: 52.0,

As is evident from the table, none of the Yanagihara examples contain Co in an amount greater than 0 wt% and less than or equal to 6 wt%, as claimed by the Applicant. Further, the Examiner admits that Yanagihara fails to meet the claimed range of La when the Co content is assumed to be 6.0 wt%. Thus, the disclosure of Yanagihara does not disclose alloys having overlapping concentration ranges, either in the general description or in the examples.

Second, the purpose of the Yanagihara reference is to provide a sealed alkaline battery having a lowered increase of the internal battery pressure by overcharging (page 3, lines 14-16). In describing alloys which lower the increase in battery pressure, Yanagihara provides no teaching or suggestion to provide an alloy having the claimed ranges of elements, particularly greater than 0% and less than or equal to 6 wt% Co.

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The purpose of the instant invention, which is quite unrelated to the purpose and teaching of the Yanagihara reference, is to combine the favorable particle size properties of alloys having high cobalt content with the favorable discharge properties of alloys having low cobalt content. As stated in the specification, alloys with higher cobalt contents are less liable to particle size reduction in their hydrogen-loaded state and effective in prolonging the lives of nickel-metal hydride rechargeable batteries when they are used for the negative electrodes thereof (the specification page 1 lines 17-23). Alloys with lower cobalt contents are more desirable for an improvement of a high rate discharge property (page 1 line 23 to page 2 line 1).

In order to solve the problems of the prior art, the present invention provides a hydrogen absorbing alloy which can improve a high rate discharge property while suppressing particle size reduction, which exhibits cycle life characteristics equal to or higher than those of conventional alloys even when its cobalt content is decreased, and which has a high capacity (page 2 lines 6-12). These goals are achieved by the invention through use of a unique alloy composition (page 6, lines 9-14).

The Yanagihara reference does not mention the problem solved by the invention, does not teach or motivate one of ordinary skill in the art to search for a solution to the problem, and does not disclose the alloys used in the claimed invention. The Yanagihara reference also does not provide any motivation to create an alloy as recited in the Claims, in order to lessen internal battery pressure, which is the motivation for forming the alloys disclosed by Yamagihara. Therefore, Applicants submit that the claimed invention is both novel and non-obvious in view of the Yanagihara reference.

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Rejection under 35 U.S.C. 103(a) in view of Hayashida

Claims 1, 5-7, 12, 16, and 17 stand rejected under 35 U.S.C. 103(a) in view of the Hayashida reference. The Office Action acknowledges that the compounds disclosed by Hayashida contain no Co (Office action page 5 lines 3-4). Furthermore, the Hayashida reference provides no motivation for including Co in its alloys. The present claims have been amended to more clearly recite the concentration of Co as greater than 0% and less than or equal to 6%. Therefore, Hayashida does not teach or suggest the claimed Co concentration ranges.

Rejection under 35 U.S.C. 103(a) in view of Kaneko

Claims 1, 5-7, 12, 16, and 17 stand rejected under 35 U.S.C. 103(a) in view of the Kaneko reference. The Office Action acknowledges that the compounds disclosed by Kaneko contain no Co (Office action page 6, lines 12-13). Furthermore, the Kaneko reference provides no motivation for including Co in its alloys. The present claims have been amended to more clearly recite the concentration of Co as greater than 0% and less than or equal to 6%. Therefore, Kaneko does not teach or suggest the claimed Co concentration ranges.

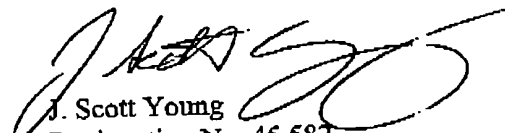
Conclusion

The rejections of record having been addressed above, Applicants submit that this application is in condition for allowance which action is respectfully solicited. Should the Examiner have any questions regarding this matter it is respectfully requested that the Examiner contact the undersigned at his convenience.

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It is not believed that extensions of time or fees for net addition of claims are required, beyond those, which may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,


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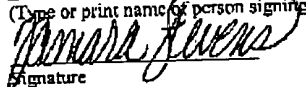
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Version with Markings to Show Changes Made:

1. (Three Times Amended) A hydrogen absorbing alloy having a CaCu_5 [type] crystal structure in its principal phase, comprising La in an amount of 24 to 33% by weight in the alloy, Mg in an amount of 0.1 to 1.0% by weight in the alloy, and greater than 0% and less than or equal to 6% by weight [or less] of Co in the alloy.

6. (Amended) A hydrogen absorbing alloy having a CaCu_5 [type] crystal structure in its principal phase, comprising Mg and having a-axis length of 4.990 to 5.050 Å and c-axis length of 4.030 to 4.070 Å for the lattice constants in the CaCu_5 [type] crystal structure.

16. (Twice Amended) A nickel-metal hydride rechargeable battery comprising an electrode formed of a hydrogen absorbing alloy having a CaCu_5 [type] crystal structure in its principal phase, said alloy comprising La in an amount of 24 to 33% by weight in the alloy, Mg in an amount of 0.1 to 1.0% by weight in the alloy, and greater than 0% and less than or equal to 6% by weight [or less] of Co in the alloy.

17. (Amended) A hydrogen absorbing alloy according to Claim 6 further comprising greater than 0% and less than or equal to 6% by weight [or less] of Co in the alloy.